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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
ABRAHAM, ESAW T	

ART UNIT	PAPER NUMBER
2133	

DATE MAILED: 12/15/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	10/037,609	HEPLER ET AL.
	Examiner	Art Unit
	Esaw T Abraham	2133

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *02 January 2002*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-39* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-39* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *02 January 2002* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. Claims **1-39** are presented for examination.

Priority

2. Acknowledgment is made of applicant's claim for domestic priority under 35 U.S.C. 119 (e) (provisional application # 60/317,85) filed on 09/06/2001.

Claim Objections

3. Claims **16, 18 and 20,** are objected to because of the following informalities:

a) Please add the word "method" to the phrase "the steps of" to read as "the method steps of" (in claims 16 and 18 lines 2 and 3) because the claim is directed to method steps for performing a calculation in a turbo decoder.

b) Please change the phrase "A storing technique" to "A storing method" (see claim 20, line 1).

Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 5, **15, 28 and 36,** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. For example: the phrase "which may be corrupted" makes the claim indefinite (see second line of claims 5, 15, 28 and 36).

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

5. Claims **1, 5, 24 and 32,** are rejected under 35 U.S.C. 101 because the claims consist of mathematical operations without practical application in the technological arts or simply manipulates abstract ideas or solves purely mathematical problems without any limitation to the practical application and further the claims are directed to an algorithm not embedded in computer readable medium. For example; a method for calculating forward and reverse metrics required for performing an output calculation to determine binary states of received signals comprising the steps of (as in claims 1, 5, 24 and 32) are only directed to mathematical algorithms rather than limited to practical applications.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S. C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

6. Claims **1-4, 15, 20-27, 32-35 and 39** are rejected under 35 U.S.C. 102(e) as being anticipated by Nakamura et al (6,757,865).

As per claims **1, 15, 20, 24 and 32,** Nakamura et al. teach or a turbo-code error correction decoding method for decoding a coded sequence which has been submitted to turbo-coding in a wireless communication device or other communication fields (see col. 1, lines 1-15). Further, Nakamura et al. teach a turbo-code error correcting decoder comprising branch metric calculating means for calculating a branch metric for a transition from time point t-1 (t=1, 2, -, N) to time point t, branch metric storing means for storing the branch metric, forward path metric calculating means for calculating a forward path metric at the time point t-1 after reading out the branch metric from the branch metric storing means, forward path metric storing means for storing the forward path metric, backward path metric calculating means for calculating backward path metric at the time point t after reading out the branch metric from the branch metric storing means, backward path metric storing means for storing the backward path metric, and soft decision information calculating means for calculating soft decision information after reading out the branch metric from the branch metric storing means, reading out the forward path metric from the forward path metric storing means, and reading out the backward path metric

from the backward path metric storing means (see col. 3, lines 37-5). **Not explicitly teach** is the step of writing forward metric calculated during the second stage into a memory location that a forward metric calculated during the first stage is being read out for use in an output calculation. **However,** the step of reading and writing from / to a memory location or a storage is inherent to the system because by virtue of the fact the process reading out and writing calculations to a storage according to a specific procedure is required and is commonly used by most of error correction circuits.

As per claims **2 and 4,** Nakamura et al. teach all the subject matter claimed in claim 1 including in figure 2 element 107 teach performing an output calculations utilizing the forward metrics calculated in the elements (103, 104) and the reverse metrics calculated in the elements (105 and 106).

As per claims **3 and 26,** Nakamura et al. teach all the subject matter claimed in claims 1 and 24 including in figure 2 element 107 teach performing output calculations utilizing the forward metrics calculated in the elements (103, 104) and the reverse metrics calculated in the elements (105 and 106). Further, Nakamura teach a turbo-code error correcting decoder comprising branch metric calculating means for calculating a branch metric for a transition from time point t-1 (t=1, 2, --, N) to time point t (see col. 1, lines 1-15). **Not explicitly** employing a clock signal in steps (e) and (f). **However,** using a clock signal is inherent to the system of Nakamura et al. since clock signals generate timing or periodic signals used for synchronization.

As per claims **21 and 23,** Nakamura et al. teach all the subject matter claimed in claims 20 and 22 including in figure 2 element 107 teach performing output calculations utilizing the

forward metrics calculated in the elements (103, 104) and the reverse metrics calculated in the elements (105 and 106).

As per claims **25 and 27**, Nakamura et al. teach all the subject matter claimed in claim 24 including in figure 2 element 107 teach performing output calculations utilizing the forward metrics calculated in the elements (103, 104) and the reverse metrics calculated in the elements (105 and 106).

As per claims **34 and 35,** Nakamura et al. teach all the subject matter claimed in claim 33 including in figure 2 element 107 teach performing output calculations utilizing the forward metrics calculated in the elements (103, 104) and the reverse metrics calculated in the elements (105 and 106).

As per claims **22, 33 and 39,** Nakamura et al. teach or disclose a turbo-code decoding system for decoding a coded sequence which has been submitted to turbo-coding in a wireless communication device or other communication fields (see col. 1, lines 1-15). Further, Nakamura et al. teach a turbo-code error correcting decoder comprising branch metric calculating means for calculating a branch metric for a transition from time point t-1 (t=1, 2, -, N) to time point t, branch metric storing means for storing the branch metric, forward path metric calculating means for calculating a forward path metric at the time point t-1 after reading out the branch metric from the branch metric storing means, forward path metric storing means for storing the forward path metric, backward path metric calculating means for calculating backward path metric at the time point t after reading out the branch metric from the branch metric storing means, backward path metric storing means for storing the backward path metric, and soft decision information calculating means for calculating soft decision information after reading out the branch metric

from the branch metric storing means, reading out the forward path metric from the forward path metric storing means, and reading out the backward path metric from the backward path metric storing means (see col. 3, lines 37-5). **Not explicitly teach** is the step of writing forward metric calculated during the second stage into a memory location that a forward metric calculated during the first stage is being read out for use in an output calculation. **However,** the step of reading and writing from / to a memory location or a storage is inherent to the system because by virtue of the fact the process reading out and writing calculations to a storage according to a specific procedure is required and is commonly used by most of error correction circuits.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere* CO., 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

7. Claims **5-14, 16-19, 28-31 and 36-38**, are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakamura et al (6,757,865) in view of Xu (U.S. PN: 6,829,313).

As per claims **5 and 28,** Nakamura et al. teach or a turbo-code error correction decoding method for decoding a coded sequence which has been submitted to turbo-coding in a wireless communication device or other communication fields (see col. 1, lines 1-15). Further, Nakamura et al. teach a turbo-code error correcting decoder comprising branch metric calculating means for calculating a branch metric for a transition from time point t-1 (t=1, 2, -, N) to time point t, branch metric storing means for storing the branch metric, forward path metric calculating means for calculating a forward path metric at the time point t-1 after reading out the branch metric from the branch metric storing means, forward path metric storing means for storing the forward path metric, backward path metric calculating means for calculating backward path metric at the time point t after reading out the branch metric from the branch metric storing means, backward path metric storing means for storing the backward path metric, and soft decision information calculating means for calculating soft decision information after reading out the branch metric from the branch metric storing means, reading out the forward path metric from the forward path metric storing means, and reading out the backward path metric from the backward path metric storing means (see col. 3, lines 37-5). **Not explicitly teach** is the step of reading a forward metric value from a memory for calculating an extrinsic value. **However,** Xu in an analogous art teaches an iterative loop of the turbo decoder increases the magnitude of the LLR such that the decision error probability will be reduced and another way to look at it is that the extrinsic information input to each decoder is virtually improving the SNR of the input sample streams and analysis is presented to show that what the extrinsic information does is to improve the virtual SNR to each constituent decoder. **Therefore,** it would have been obvious to a person having an ordinary skill in the art at the time the invention was made to **implement** the teachings

of Nakamura et al. using or calculating an extrinsic information with in the decoding process taught by Xu. **This modification** would have been obvious because a person having ordinary skill in the art would have been motivated in order to improve the virtual SNR to each constituent decoder and the coding gain (see col. 11, lines 1-10).

As per claim **6,** Nakamura et al. in view of Xu teach all the subject matter claimed in claim 5 including Nakamura et al. in figure 2 element 107 teach performing an output calculations utilizing the forward metrics calculated in the elements (103, 104) and the reverse metrics calculated in the elements (105 and 106).

As per claims **8 and 12,** Nakamura et al. in view of Xu teach all the subject matter claimed in claim 5. Not explicitly teach in the prior arts is gamma calculation. **However,** the terms alpha, gamma and beta calculations are known and common practices exist in the art of MAP decoding systems, for example; gamma provides the decoder with information how likely the transition between states based the A priori information and the likelihood of the transition based upon comparison of the symbol decoding and the symbol that this transition was expected to produce. **Therefore,** it would have been obvious to a person having an ordinary skill in the art at the time the invention was made to perform the gamma. **This modification** would have been obvious because a person having ordinary skill in the art would have been motivated in order to achieve higher coding gains.

As per claims **7, 9-11, 13 and 14,** Nakamura et al. in view of Xu teach all the subject matter claimed including Xu teaches that the SNR for each received data samples are changing as iterations go on because the input extrinsic information will increase the virtual or intrinsic SNR. Moreover, the corresponding SNR for each parity sample will not be affected by the

iteration. Clearly, if x.sub.i has the same sign as z.sub.i, we have EQU23 (see col, 12, lines 25-35).

As per claims **16-19 and 36,** Nakamura et al. teach a turbo-code error correcting decoder comprising branch metric calculating means for calculating a branch metric for a transition from time point t-1 (t=1, 2, -, N) to time point t, branch metric storing means for storing the branch metric, forward path metric calculating means for calculating a forward path metric at the time point t-1 after reading out the branch metric from the branch metric storing means, forward path metric storing means for storing the forward path metric, backward path metric calculating means for calculating backward path metric at the time point t after reading out the branch metric from the branch metric storing means, backward path metric storing means for storing the backward path metric, and soft decision information calculating means for calculating soft decision information after reading out the branch metric from the branch metric storing means, reading out the forward path metric from the forward path metric storing means, and reading out the backward path metric from the backward path metric storing means (see col. 3, lines 37-5). **Not explicitly teach** is the step of reading a forward metric value from a memory for calculating an extrinsic value. **However,** Xu in an analogous art teaches an iterative loop of the turbo decoder increases the magnitude of the LLR such that the decision error probability will be reduced and another way to look at it is that the extrinsic information input to each decoder is virtually improving the SNR of the input sample streams and analysis is presented to show that what the extrinsic information does is to improve the virtual SNR to each constituent decoder. **Therefore,** it would have been obvious to a person having an ordinary skill in the art at the time the invention was made to **implement** the teachings of Nakamura et al. using or calculating an

extrinsic information with in the decoding process taught by Xu. **This modification** would have been obvious because a person having ordinary skill in the art would have been motivated in order to improve the virtual SNR to each constituent decoder and the coding gain (see col. 11, lines 1-10).

As per claims **29-31,** Nakamura et al. in view of Xu teach all the subject matter claimed in claims 22 and 28 including Xu teaches that the SNR for each received data samples are changing as iterations go on because the input extrinsic information will increase the virtual or intrinsic SNR. Moreover, the corresponding SNR for each parity sample will not be affected by the iteration. Clearly, if x.sub.i has the same sign as z.sub.i, we have EQU23 (see col, 12, lines 25-35).

As per claims **37 and 38,** Nakamura et al. in view of Xu teach all the subject matter claimed in claim 36 including Xu teaches that the SNR for each received data samples are changing as iterations go on because the input extrinsic information will increase the virtual or intrinsic SNR. Moreover, the corresponding SNR for each parity sample will not be affected by the iteration. Clearly, if x.sub.i has the same sign as z.sub.i, we have EQU23 (see col, 12, lines 25-35).

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

US PN: 6,754,290 Halter, Steven J

US PN: 6,563,877 Abbaszadeh, Ayyoob

US PN: 6,725,409 Wolf, Tod D

US PN: 6,452,979 Eidson, Donald Brian

US PN: 6,343,368 Lerzer, Jurgen

9. Any inquiry concerning this communication or earlier communication from the examiner should be directed to Esaw Abraham whose telephone number is (571) 272-3812. The examiner can normally be reached on M-F 8-5.

If attempts to reach the examiner by telephone are successful, the examiner's supervisor, Albert DeCady can be reached on (571) 272-3819. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 746-7239 for regular communications and (703) 746-7238 for after final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-3900.

Esaw Abraham

Art unit: 2133

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